REMARKS

The present response is intended to be fully responsive to all points of objection and/or rejection raised by the Examiner and is believed to place the application in condition for allowance. Applicants assert that the present invention is new, non-obvious and useful. Prompt consideration and allowance of the claims is respectfully requested.

Status of Claims

Claims 5 and 6 are pending and have been rejected.

Claims 5 and 6 have herein been amended, and new claim 7 has herein been added. Applicants respectfully assert that the amendments to the claims and the new claims add no new matter.

CLAIM REJECTIONS

35 U.S.C. § 103 Rejections

In the final Office Action, the Examiner maintained her rejections of claims 5 and 6 under 35 U.S.C. § 103(a) as being unpatentable over Barkley (U.S. Patent No. 2676114). Applicants respectfully traverse this rejection in view of the remarks that follow.

The present invention relates to an improved process for the co-deposition of materials on a substrate in progressively varying relative amounts. The aim is to be able to produce controlled libraries of a wide compositional range quickly and easily, with the deposition profile and rate of each material (i.e., from each source) being able to be controlled independently in a straightforward manner. Co-deposition of materials in this way allows the synthesis of libraries with a large compositional range without the need for subsequent heat treatment to achieve mixing of the components, as would be required with sequential deposition methods known in the art. The process of the invention finds particular utility in, for example, screening of non-equilibrated metal alloys and in the synthesis of mixed metal oxides, nitrides and hydrides.

By contrast, Barkley is not at all concerned with the synthesis of chemical compositions, but is instead concerned with producing graded coatings of a single material on

industrial objects such as automobile windshields (Example 1), lenses (Example 2) and decorative jars (Example 3). In all cases of Barkley, a graded coating of a single material is produced. Thus, the teaching of Barkley lies within the technical field of industrial coatings, which is a very different technical field compared to that of the present invention, namely chemical synthesis of compositional libraries.

Applicants previously argued that the claimed invention requires that each source have its own mask, i.e., there is a mask per source. The Examiner responded in the Advisory Action that the claims only require an associated mask for the sources, not one mask per source.

Applicants note that the claims have herein been amended to clearly express this feature. Specifically, independent claim 5 recites a method of depositing at least two vapor materials on a substrate and has been amended to recite the step of "positioning a mask between each of at least two vapor sources and said substrate, such that there is a separate mask between each vapor source and said substrate".

Applicants further note that the claims have herein been amended to clearly express that different vapor materials are vaporized from each source. Now, amended independent claim 5 recites depositing at least two different materials from at least two vapor sources, that there is a separate mask between each vapor source and the substrate, and the specific geometrical arrangement of each vapor source, its associated mask and the substrate.

By contrast, Barkley, as shown in Figs. 4 and 5 and all other relevant figures, provides only a single mask 50 regardless of how many vapor deposition sources are present, not a mask per vapor source. (Figure 9 provides a second mask very close to the substrate in order to "cut off" the area 104, and is thus not relevant in the context of the present claims.) Furthermore, even where Barkley employs multiple sources, each is a source of the same material, and Barkley never suggests that different materials should be deposited on the same substrate. Accordingly, Barkley cannot anticipate the claims as amended herein.

The Examiner contended that, according to Barkley, "the positioning of the mask in a plane parallel to the plane defined by the substrate [is] such that the material is deposited on the substrate in a thickness which increases substantially continuously in a direction along the substrate", referring to Figures 6, 7 and 9 of Barkley. The Examiner stated in the Advisory Action that Applicants argued that "the claim includes a thickness that increases 'substantially continuously', which is not synonymous with a continuously varying gradient" and that this limitation is not present in the claims.

Applicants continue to argue that Barkley discloses a method of producing graded coatings and discusses shadowing of multiple point sources, thereby resulting in "steps" (see Figs. 3, 4, 6-10, 13, 14 and 16) rather than "a thickness which increases substantially continuously in a direction along the substrate", as recited in claim 5. For example, Barkley's Fig. 5 clearly shows the use of 'point' sources, which can produce only stepped, rather than smooth, deposition gradients (see, e.g., Barkley's Figs. 4 and 6-10 for stepped deposition profiles). By contrast, claim 5 recites that "each mask is positioned ... such that the vaporized material is deposited on the substrate in a thickness which increases substantially continuously in a direction along the substrate." Applicants contend that the stepped deposition profiles of Barkley are not the same as or even equivalent to "a thickness which increases substantially continuously in a direction along the substrate."

Applicants point out that Fig. 7 of Barkley uses a tilted filament wire as vapor source in an arrangement having one source 79, one mask 80 and one substrate 75. The Examiner alleges that this arrangement produces a continuous gradation of the single material across a small area 78 of the substrate. However, Applicants point out that this arrangement does not deposit at least two different vapor materials, does not have at least two vapor sources each with a corresponding mask, and does not meet the geometrical limitations of independent claim 5. Furthermore, as Barkley admits at col. 6, lines 18-22, tilted sources are not usually preferred. Thus, Applicants believe that this teaching of Barkley does not anticipate the claimed invention.

With regard to Applicants' arguments that the mask positioning in Barkley fails to satisfy the claimed geometry (especially with regard to H_y), the Examiner stated in the

Advisory Action that "H_x and H_y are not defined by concrete values and therefore may be any number as the planes shown in the Figures of Barkley certainly have an E, F, A, C and D as defined" and that placement of the mask "may be modified by routine experimentation".

Independent Claim 5 recites that the position of each mask must be within a quadrilateral *area* defined, among other things, by requiring that the plane containing the mask (the first place) must be at a "perpendicular distance *greater* than H_y from the plane defined by the substrate". This *area* corresponds to the quadrilateral H_2-H_1-C_2-C_1 as depicted in Fig. 2 of the present application. If the mask is positioned within this area, then continuous variation in the thickness of material deposited on the substrate is achieved across at least a significant portion of the substrate, or indeed across the whole substrate. Continuous variation across the whole substrate is achieved if the mask is positioned in accordance with dependent claim 6, which defines a triangular *area* within the quadrilateral area, the apex of said triangular area having defined coordinates H_x, H_y. This *area* corresponds to the triangle H-C_2-C_1 as depicted in Fig. 2 of the present application. These geometric arrangements allow utilization of the substrate across a substantial part or all of its surface for preparing varying chemical compositions, minimizing or eliminating areas on the substrate (plateaus or areas of no deposition) where the composition of the material does not vary.

Applicants point out that Barkley teaches neither the arrangement of independent claim 5 (quadrilateral area) nor that of independent claim 6 (triangular area). First of all, point sources such as shown in Barkley's Figs. 1-6, 8-10 and 12 do not have C, which is defined in claim 5 as "the source size, said source size being defined as the distance between the points of the extremities of the source lying within the second plane". Furthermore, point sources do not have extremities (and are thus not within the scope of the present claims). To the extent that a value can be assigned to C for a point source, that value must be considered to be equal to 0, with the result that H_y in independent claim 5 becomes equal to E + F, so that the mask would lie in the plane of the source. Such an arrangement would not function.

Barkley's Fig. 7 uses a filament source and thus has a non-zero value for C. However, it can clearly be seen from Fig. 7 that the mask has not been positioned as required by independent claim 5, as the plane containing the mask is at a distance *less than*, and not greater than, H_y from the plane containing the substrate. This is the reason for the area of continuous

variation 78 being small, the remaining areas of the substrate surface having a plateau or no deposition. This arrangement is disadvantageous if one's aim is to utilize the greatest possible area of the substrate for forming a wide range of different compositions (of course, as already emphasized, Barkley's Fig. 7 is, in any case, not concerned with forming *compositions*, but rather is concerned with providing graded deposition of a single substance).

In addition, Applicant further points out that Barkley teaches away from the claimed invention with his equation for defining an ***exact*** position of a single mask from a point vapor source (equation 3 in column 5 of Barkley). By contrast, claim 5 defines an area in which the mask may be placed, rather than a precise position, for the distance between the mask and the substrate (H_y).

Accordingly, it is not correct that the positioning of the masks is a matter of mere routine experimentation, since positioning of the masks is the product of detailed technical thought and calculations, as recited in claims 5 and 6.

Accordingly, Applicants respectfully assert that amended independent claim 5 is not rendered obvious by Barkley. Claims 6 and 7 depend directly from amended independent claim 5 and therefore include all the limitations of that claim, such that claims 6 and 7 are likewise allowable. Applicants respectfully request that the Examiner withdraw this rejection.

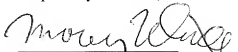
Conclusion

In view of the foregoing amendments and remarks, Applicants assert that the pending claims are allowable. Their favorable reconsideration and allowance is respectfully requested.

Should the Examiner have any question or comment as to the form, content or entry of this Amendment, the Examiner is requested to contact the undersigned at the telephone number below. Similarly, if there are any further issues yet to be resolved to advance the prosecution of this application to issue, the Examiner is requested to telephone the undersigned counsel.

Please charge any fees associated with this paper to deposit account No. 50-3355.

Respectfully submitted,



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